

WE CLAIM:

1 1. A process of making a magnetoresistive
2 memory device comprising:
3 making a mask having stepped bit ends;
4 using the mask to make a magnetic storage layer
5 having tapered bit ends;
6 using the mask to make a magnetic sense layer
7 having tapered bit ends; and,
8 using the mask to make a non-magnetic layer
9 between the magnetic sense layer and the magnetic storage
10 layer, and wherein the non-magnetic layer has tapered bit
11 ends.

1 2. The process of claim 1 wherein the
2 magnetic storage layer comprises one or more magnetic
3 storage films.

1 3. The process of claim 1 wherein the
2 magnetic storage layer comprises first and second
3 magnetic storage films, wherein the first magnetic
4 storage film comprises NiFe, and wherein the second
5 magnetic storage film comprises CoFe.

1 4. The process of claim 1 wherein the
2 magnetic sense layer comprises one or more magnetic sense
3 films.

1 5. The process of claim 1 wherein the
2 magnetic sense layer comprises first and second magnetic
3 sense films, wherein the first magnetic sense film
4 comprises NiFe, and wherein the second magnetic sense
5 film comprises CoFe.

1 6. The process of claim 1 wherein the
2 magnetic storage layer comprises one or more magnetic
3 storage films, and wherein the magnetic sense layer
4 comprises one or more magnetic sense films.

1 7. The process of claim 1 wherein the
2 magnetic storage layer comprises first and second
3 magnetic storage films, wherein the magnetic sense layer
4 comprises first and second magnetic sense films, wherein
5 the first magnetic storage film comprises NiFe, wherein
6 the second magnetic storage film comprises CoFe, wherein
7 the first magnetic sense film comprises NiFe, and wherein
8 the second magnetic sense film comprises CoFe.

1 8. The process of claim 1 wherein the
2 magnetic sense film comprises a ferromagnetic sense film.

1 9. The process of claim 1 wherein the
2 magnetic storage film comprises a ferromagnetic storage
3 film.

1 10. The process of claim 9 wherein the
2 magnetic sense film comprises a ferromagnetic sense film.

1 11. The process of claim 1 wherein the using
2 of the mask to make a magnetic storage layer having
3 tapered bit ends, the using of the mask to make a
4 magnetic sense layer having tapered bit ends, and the
5 using of the mask to make a non-magnetic layer between
6 the magnetic sense layer and the magnetic storage layer
7 are performed in a single lithographic patterning step.

1 12. The process of claim 1 wherein the using
2 of the mask to make a magnetic storage layer having
3 tapered bit ends, the using of the mask to make a
4 magnetic sense layer having tapered bit ends, and the
5 using of the mask to make a non-magnetic layer between

6 the magnetic sense layer and the magnetic storage layer
7 are performed as separate lithographic patterning steps.

1 13. A magnetoresistive device made by the
2 process of claim 1.

1 14. A process of making a magnetoresistive
2 memory device comprising:

3 laying out a mask layout in grids having a
4 central grid forming a central section and outer grids
5 forming bit end sections, and wherein the grids of the
6 bit end sections are rectangles;

7 making a mask by use of the mask layout,
8 wherein the mask has stepped bit ends;

9 using the mask to make a magnetic storage layer
10 having tapered bit ends;

11 using the mask to make a magnetic sense layer
12 having tapered bit ends; and,

13 using the mask to make a non-magnetic layer
14 between the magnetic sense layer and the magnetic storage
15 layer, wherein the non-magnetic layer has tapered bit
16 ends.

1 15. The process of claim 14 wherein the
2 magnetic storage layer comprises one or more magnetic
3 storage films.

1 16. The process of claim 14 wherein the
2 magnetic storage layer comprises first and second
3 magnetic storage films, wherein the first magnetic
4 storage film comprises NiFe, and wherein the second
5 magnetic storage film comprises CoFe.

1 17. The process of claim 14 wherein the
2 magnetic sense layer comprises one or more magnetic sense
3 films.

1 18. The process of claim 14 wherein the
2 magnetic sense layer comprises first and second magnetic
3 sense films, wherein the first magnetic sense film
4 comprises NiFe, and wherein the second magnetic sense
5 film comprises CoFe.

1 19. The process of claim 14 wherein the
2 magnetic storage layer comprises one or more magnetic
3 storage films, and wherein the magnetic sense layer
4 comprises one or more magnetic sense films.

1 20. The process of claim 14 wherein the
2 magnetic storage layer comprises first and second
3 magnetic storage films, wherein the magnetic sense layer
4 comprises first and second magnetic sense films, wherein
5 the first magnetic storage film comprises NiFe, wherein
6 the second magnetic storage film comprises CoFe, wherein
7 the first magnetic sense film comprises NiFe, and wherein
8 the second magnetic sense film comprises CoFe.

1 21. The process of claim 14 wherein the
2 magnetic sense film comprises a ferromagnetic sense film.

1 22. The process of claim 14 wherein the
2 magnetic storage film comprises a ferromagnetic storage
3 film.

1 23. The process of claim 22 wherein the
2 magnetic sense film comprises a ferromagnetic sense film.

1 24. The process of claim 14 wherein the using
2 of the mask to make a magnetic storage layer having
3 tapered bit ends, the using of the mask to make a
4 magnetic sense layer having tapered bit ends, and the

5 using of the mask to make a non-magnetic layer between
6 the magnetic sense layer and the magnetic storage layer
7 are performed in a single lithographic patterning step.

1 25. The process of claim 14 wherein the using
2 of the mask to make a magnetic storage layer having
3 tapered bit ends, the using of the mask to make a
4 magnetic sense layer having tapered bit ends, and the
5 using of the mask to make a non-magnetic layer between
6 the magnetic sense layer and the magnetic storage layer
7 are performed as separate lithographic patterning steps.

1 26. A magnetoresistive device made by the
2 process of claim 14.